# YEAR 2 (2009) MONITORING REPORT

## LOS GATOS CREEK TRAIL REACH 4
## RIPARIAN MITIGATION PROJECT

## SAN JOSE, CALIFORNIA

Submitted to:

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LSA Project No. SJO0901

LSA

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# 1.0 PROJECT OVERVIEW

This report details annual monitoring of mitigation planting areas conducted by LSA in 2009 for the Los Gatos Creek Trail Reach 4 riparian mitigation project, implemented in 2007 by the City of San Jose (City) in 2007 and permitted by the following resources agencies:

- San Francisco Bay Regional Water Quality Control Board Site No.: 02-43-C0513
- California Department of Fish and Game Streambed Alteration Agreement
- U.S. Army Corps of Engineers File No.: 299130S (annual report not required)

In 2007 the City constructed a trail extension along the top of bank of Los Gatos Creek, located in the City of San Jose, Santa Clara County, California (Figure 1). Construction of the Los Gatos Creek Trail extension impacted mixed riparian forest and shaded riverine aquatic habitat. Mitigation for these impacts consisted of planting 169 native riparian trees and shrubs at two sites along the trail (Figure 2). Site #1 (11,500 square feet, or 0.26 acre) is located downstream (west) of Meridian Avenue and can be accessed via a trailhead in the residential neighborhood on St. Elizabeth Drive. Site #2 (10,400 square feet, or 0.24 acre) is located downstream (south) of Auzerais Avenue and can be accessed via the trailhead at Auzerais Avenue near Hannah Street.

The project impacts and mitigation measures were outlined in the following project documents:

- *Final Los Gatos Creek Reach 4 Trail Extension Riparian/SRA Habitat Mitigation and Monitoring Plan* (**MMP**), prepared by H.T. Harvey & Associates for David J. Powers & Associates, September 14, 2004;
- *Los Gatos Creek Trail Reach 4 Riparian Mitigation Maintenance Manual*, prepared by Biotic Resources Group, December 12, 2005; and
- *Plans and Specifications for Los Gatos Creek Trail Reach 4: Lincoln Avenue to Auzerais Avenue*, prepared by the City of San Jose, September 2005.

The Department of Public Works was responsible for the project construction, implementation of mitigation, and the first year (2008) of mitigation monitoring. The responsibility for maintenance and monitoring (for the remainder of the 10-year period) was transferred to the Department of Parks, Recreation and Neighborhood Services in 2009. Year 1 (2008) monitoring was conducted by Biotic Resources Group.

# 2.0 RESPONSIBLE PARTIES

**Monitoring and Reporting**

**LSA Associates, Inc.**

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Steve Foreman, Principal/Biologist
Leslie Allen, Senior Biologist/Project Manager
Dan Sidle, Biologist

**Landscape Maintenance**

**City of San Jose**

Department of Parks, Recreation and Neighborhood Services
200 E. Santa Clara Street, Tower – 9th Floor
San Jose, CA 95113
Mike Will, Parks Manager

**Central Coast Wilds**

125 Walk Circle
Santa Cruz, CA 95060
(831) 459-0656
Jon Laslett, foreman

**Permittee**

**City of San Jose**

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## 3.0 MONITORING REQUIREMENTS AND PERFORMANCE STANDARDS

The MMP (H.T. Harvey & Associates 2004) established the following performance standards for riparian mitigation areas over a 10-year monitoring period.

- *Plant Replacement* – During the first three years (plant establishment period) overall plant survival shall not drop below 80%. If, at any time during the 3-year plant establishment period, survival falls below 80%, then replanting will occur.
- *Percent Cover* – Percent cover of woody species will be monitored in Years 1-5, 7, and 10. The MMP provides two different performance criteria for the two types of riparian vegetation associations that were planted. No performance criteria for percent cover exist for Years 1 and 2, as it is anticipated that the cover values will be negligible for the young plants; however, the riparian plantings should be progressing toward meeting Year 3 criteria in 2010. The Year 3 criteria for percent woody cover are:

  Site #1 – Riparian Woodland Association – 10%

  Site #2 – Mixed Riparian Association – 15%
- *Tree Height* – Tree height will be monitored in Years 1-5, 7, and 10. No specific tree heights are set for Years 1 and 2 because the height of individual trees from the nursery will be variable. It is anticipated that by Year 3 these differences will be negligible.

- *Tree Health and Vigor* – The overall health and vigor of all planted trees [and shrubs] will be monitored in Years 1-5, 7, and 10 using numerical values provided in the MMP. There are no performance criteria for tree health and vigor.

# 4.0 MONITORING SCHEDULE AND METHODS

In addition to two reconnaissance visits in March and July, LSA biologists Leslie Allen and Dan Sidle performed vegetation monitoring at Sites #1 and #2 on April 28 and October 7. In April, at Site #1, overgrowth of tall grasses and other weeds made riparian plantings and transects extremely difficult to locate; therefore, quantitative monitoring at this site was postponed until October, after weed removal and other maintenance had been conducted. Quantitative vegetation monitoring was performed at Site #2 in April, with updates to plant survival numbers made in October. During the field surveys, the biologists performed several tasks, described below.

## 4.1 Quantitative Monitoring of Plant Survival and Recruitment

Quantitative data pertaining to plant cover, plant survival, height, vigor and health, were recorded on data sheets and then entered into a digital spreadsheet (Microsoft® Office Xcel 2003) for analysis.

**Plant Survival.** Plant survival was determined by counting each of the surviving plants installed and noting those that were dead. Plant survival was calculated per species and per site by dividing the number alive at the time of monitoring by the total number installed.

**Percent Cover.** As prescribed in the MMP, percent cover of woody plants was measured using the line intercept method (Bonham 1989) employed along two fixed transects per site. Percent cover was calculated by species and by site by averaging the values achieved for each of two transects. The locations of vegetation transects are depicted in Figures 3 and 4.

**Tree Height.** Tree and shrub height was measured using a graduated 8-foot rod. The riparian plantings are not yet tall enough to require the use of a clinometer to measure height.

**Plant Health and Vigor.** A qualitative assessment of the health and vigor of trees and shrubs was quantified using numerical values provided in the MMP and Table 1, below. Overall health and vigor was assessed by considering such factors as plant color, bud development, new growth, herbivory, drought stress, fungal/insect infestation, and physical damage.

**Table 1. Numerical Values for Assessing Plant Health and Vigor**

| Value | Health/Vigor | Observations |
|---|---|---|
| **1-3** | High health and vigor | 67-100% healthy foliage |
| **4-6** | Medium health and vigor | 34-66% healthy foliage |
| **7-9** | Low health and vigor | 0-33% healthy foliage |

### 4.2 Qualitative Assessment of Site Conditions Affecting Revegetation

LSA biologists performed a qualitative assessment of several factors that typically contribute to the success or failure of mitigation planting projects. In addition to maintenance and irrigation, these factors include natural recruitment of native plant species, competition from non-native plants, soil conditions, hydrologic conditions, pollution, and public use. Photographs were taken to visually document current conditions at the site and, where possible, compare them to conditions shown in photographs taken from the same vantage points in Year 1. Permanent photo station locations are depicted in Figures 3 and 4. The site photographs are provided in Appendix B.

## 5.0 MAINTENANCE ACTIVITIES

Constraints on the City's budget and staffing have limited the availability of Parks Department staff to perform maintenance activities at the mitigation planting sites in 2009. Parks Department maintenance staff retained responsibility for weed control, mowing and hand-watering at Site #2, where the panting area is level with the multi-use trail. The City provided funds for a contractor (Central Coast Wilds, as a subcontractor to LSA) to conduct weed management and irrigation at Site #1, where the planting areas are located on slopes below the level plane of the trail.

Parks Department staff performed mowing and weed removal at Site #2 in spring and early summer. Parks Department staff were unable to irrigate the plantings by hand weekly during the dry season, as prescribed in the *Riparian Mitigation Maintenance Manual*. Hand watering was conducted approximately 8 times during the dry season.

Central Coast Wilds performed weed removal and weed-whipping at Site #1 in July and November. They also recharged irrigation gel packs in the planting basins in July and October.

## 6.0 MONITORING RESULTS

**Plant Survival Site #1.** Overall plant survival as measured in October 2009 was low at 54% (Table 2) and does not meet the 80% survival criterion. Most of the mortality was suffered by willows and cottonwoods, which were planted without irrigation in areas where highly invasive weeds such as English ivy are dense. None of the cottonwoods survived, indicating that this species is not appropriate for the site. Only 6 out of 20 willows survived, indicating that appropriate planting sites for willow poles without irrigation are not abundant. Willows may fare better if replanted with irrigation. Among the shrub species planted, only mugwort meets or exceeds the required 80% survival rate. Among the tree species planted, only box elder and coast live oak meet or exceed the required 80% survival rate. Replanting before March 2010 is required at Site #1.

**Plant Survival Site #2.** When quantitative monitoring was conducted at Site #2 in April, overall plant survival was very high at 97% (Table 3). When the site was revisited in October several plants had died, apparently due to insufficient irrigation during summer and fall. Overall plant survival in October was 78%; just below the required 80% survival rate. Among the shrub species planted, coyote brush is the best suited to the site conditions because, even with insufficient irrigation, 100% of the plantings are alive and growing vigorously. Only 6 out of 11 holly-leaved cherry shrubs were alive in October. Among the tree species planted, box elder and blue elderberry had the highest survival rates (100%) in October. Coast live oak plantings suffered high mortality during summer

(see Site Photo 15), as indicated by a reduction from 100% survival in April to 53% survival in October. Replanting before March 2010 is required at Site #2.

**Table 2. Year 2 (2009) Plant Survival in Mitigation Planting Site #1**

| Riparian Species | Common Name | # Installed January 2008 | # Alive October 2009 | Year 2 Percent Survival | Avg. Vigor/ Health[1] | Avg. Height (feet) |
|---|---|---|---|---|---|---|
| ***Shrubs*** | | | | | | |
| *Artemisia douglasiana* | Mugwort | 8 | 8 | 100% | 3.0 | 2.0 |
| *Prunus ilicifolia* | Holly-leaved cherry | 11 | 8 | 73% | 1.3 | 2.3 |
| *Rubus ursinus* | California blackberry | 21 | 11 | 52% | 3.5 | 0.9 |
| ***Trees*** | | | | | | |
| *Acer negundo* | Box elder | 3 | 3 | 100% | 2.7 | 6.3 |
| *Aesculus californica* | California buckeye | 11 | 7 | 64% | 3.4 | 2.1 |
| *Populus fremontii* | Fremont cottonwood | 11 | 0 | 0% | | |
| *Quercus agrifolia* | Coast live oak | 5 | 5 | 100% | 1.4 | 2.8 |
| *Salix* sp. | Willow | 20 | 6 | 30% | 2.0 | 10.0 |
| *Sambucus mexicana* | Blue elderberry | 6 | 4 | 67% | 2.0 | 6.3 |
| ***TOTAL*** | | **96** | **52** | **54%** | | |

[1] Numerical values defined in Table 1.

**Table 3. Year 2 (2009) Plant Survival in Mitigation Planting Site #2**

| Riparian Species | Common Name | # Installed January 2008 | # Alive April 2009 | Percent Survival April 2009 | Avg. Vigor/ Health[1] | Avg. Height (feet) | # Alive October 2009 | Final Year 2 Percent Survival |
|---|---|---|---|---|---|---|---|---|
| ***Shrubs*** | | | | | | | | |
| *Baccharis pilularis* | Coyote brush | 13 | 13 | 100% | 1.9 | 3.8 | 13 | 100% |
| *Prunus ilicifolia* | Holly-leaved cherry | 11 | 10 | 91% | 4.0 | 1.2 | 6 | 55% |
| ***Trees*** | | | | | | | | |
| *Acer negundo* | Box elder | 7 | 7 | 100% | 2.4 | 4.0 | 7 | 100% |
| *Aesculus californica* | California buckeye | 9 | 8 | 89% | 3.5 | 2.6 | 7 | 78% |
| *Quercus agrifolia* | Coast live oak | 19 | 19 | 100% | 2.7 | 2.9 | 10 | 53% |
| *Sambucus mexicana* | Blue elderberry | 14 | 14 | 100% | 2.6 | 2.7 | 14 | 100% |
| ***TOTAL*** | | **73** | **(71)** | **(97%)** | | | **57** | **78%** |

[1] Numerical values defined in Table 1.

**Health and Vigor.** The majority of surviving container plantings at Site #1 and Site #2 are characterized by "high" health and vigor (Tables 2 and 3). Examples of vigorous plant growth are depicted in Site Photos 7, 8, 11 and 13. There are no performance standards in the MMP for health and vigor.

**Tree Height.** There is no performance standard for average tree height in Year 2. The trees that have survived and are healthy and vigorous are likely to meet their height criteria in Year 3. The trees at Site #1 are generally taller than those at Site #2.

**Plant Cover Site #1.** Cover of woody species measured by two transects at Site #1 is 6%. Cover by native woody riparian plant species must increase by 4% next year to meet the Year 3 performance criterion of 10%. Additional growth of the surviving plants combined with replacement plantings should provide sufficient cover to meet this criterion by the end of next year's growing season.

A visual comparison of Transect T-1 in Year 2 and Year 1 is depicted in Site Photos 1 and 2, respectively. A visual comparison of Transect T-2 in Year 2 and Year 1 is depicted in Site Photos 5 and 6, respectively.

**Plant Cover Site #2.** Cover of woody species measured by two transects at Site #2 is 5%. Cover by native woody riparian plant species must increase by 10% next year to meet the Year 3 performance criterion of 15%. Because percent cover at this site was measured in April when plant survival was high, it is unlikely that replacement plantings will contribute substantially to an increase in cover by the end of next year's growing season. Overall percent cover is expected to increase somewhat next year due to continued growth of the surviving plantings, but this may not be enough to meet the 15% cover criterion. At this stage, no remedial action is recommended beyond replacement planting, described later in this report. It is most likely the placement of the permanent transects that is resulting in low cover values. As the planted trees at this site mature and their canopies expand and intercept with the transects, higher cover values will be measurable.

A visual comparison of Transect T-1 in Year 2 and Year 1 is depicted in Site Photos 9 and 10, respectively. A visual comparison of Transect T-2 in Year 2 and Year 1 is depicted in Site Photos 13 and 14, respectively.

**Natural Recruitment.** Some natural recruitment of native plant species has already occurred in the mitigation planting areas. At Site #1, two coast live oak seedlings were observed growing within the protective cages around plantings that had died. At Site #2, one coast live oak seedling was observed growing with the planting basin of a living holly-leaved cherry shrub.

**Invasive Non-Native Plants.** Competition from invasive non-native plants is much greater at Site #1 than at Site #2. Non-native annual grasses are the primary concern at Site #2 and the City is succeeding at controlling them by mowing and weed-whipping between plantings and removing weeds by hand from the planting basins.

Weed control at Site #1 is much more labor intensive due to the steep terrain and the type of weeds that occur there. Because funds to pay a contractor for weed removal at this site were limited, LSA biologists assigned priority for weed removal to areas where container plantings had been installed. Central Coast Wilds cut and cleared non-native annual grasses, mustard, radish, fennel, and perennial

pepperweed (*Lepidium latifolium*) from the planting areas in July. They returned in November for follow-up weed removal after early fall rains and unseasonably warm temperatures resulted in spring-like regrowth of some species. Weed control was not prioritized on the lower banks of the creek channel, where major infestations of English ivy and fennel that were cleared when the project was constructed have become re-established. These infestations are located where willow and cottonwood poles were installed without irrigation and well beyond where most of the container plantings were installed.

**Soil.** LSA observed fair to very good soil conditions at Site #1 and Site #2. The soil at Site #1 is friable and appears to contain sufficient organic matter to support vegetation establishment without amendment. Because Site #1 is located on a slope (see Site Photos 3 and 4) and supports small burrowing mammals, the soil is more prone to erosion; however, it is less prone to compaction by hikers or vehicles. The soil at Site #2 is slightly more compacted, most likely because the area is flat and was previously paved and/or graded. There is no evidence of erosion at Site #2.

**Hydrology.** The majority of container plantings installed at Site #1 are located on the mid-slope to the top of the northwest bank of the creek, above the water level of a typical 2-year storm event. The willow and cottonwood poles were planted at or just above the typical high water line, where they are subject to inundation during typical 2-year storm events. Existing mature trees are scattered throughout Site #1, creating shade that may help retain moisture in the soil for much of the year. Site #2 is very dry. The entire planting area is located high above the channelized creek and is unlikely to flood during typical or even severe storm events. No shade is provided by the nearest existing mature trees to help retain soil moisture during the hot dry months.

**Other Factors.** LSA observed no evidence of pollution, excessive herbivory or other factors that might be affecting the success or failure of vegetation establishment at Site #2. The primary factor concerning plant survival at Site #2 is irrigation (see *Discussion*). At Site #1, a small fire occurred sometime between LSA's site visits in April and July. The fire burned a small area of the vegetated sacrete slope above the concrete vehicle ramp at the downstream end of the mitigation planting area. An existing mature tree was partially scalded and one holly-leaved cherry planting was burned (see Site Photo 16). The planted shrub may resprout at the base and should be monitored before replacing. There is no evidence of off-trail hiking or other impacts to the plantings from public use at either site.

## 7.0 CONCLUSIONS AND DISCUSSION

Overall, the two mitigation planting areas are performing relatively well and have the potential to perform better next year. Replacement planting and continuation of weed management and irrigation are needed at both sites to meet the success criteria next year.

### Irrigation

Plantings at both sites will benefit from continuing irrigation during the dry season of Year 3 (2010). Plants with low survival rates at Site #2 are not necessarily unsuitable for this site. These species were thriving in April are likely to survive as long is irrigation is performed as required. Hand-watering does not appear to be a practical or reliable irrigation method. The City should consider installing an irrigation system at Site #2 to ensure the survival and expansion of the mitigation

riparian vegetation. Gel packs or a drip or overhead spray system connected to a portable water tank would be suitable.

### Weed Management

The City should continue managing non-native grasses and other weeds at Site #2 in Year 3, as it has successfully in Years 1 and 2. At Site #1, weed management on the upper banks where container plants were installed is effective and should be conducted at least once in Year 3. Managing English ivy and fennel on the lower banks of Site #1 is not a high priority. These species are not likely to be eradicated from the site because they are well established and additional large populations are located on both sides of the creek and just upstream of the mitigation area. An effort should be made, however, to keep these species from encroaching into the planting areas.

## 8.0 MANAGEMENT RECOMMENDATIONS

### Site #1 (Meridian Avenue)

- Continue managing typical non-native invasive plants (i.e., grasses, fennel, mustard, radish, perennial pepperweed) on the upper slopes by weed whipping and hand removal at least once per year.
- Continue recharging irrigation gel packs during Year 3.
- Install 30 replacement plantings in existing planting basins (unless otherwise indicated) to bring survival rates above 80%:

| | |
|---|---|
| <u>Trees</u> | |
| *California buckeye* | - plant 2 |
| *Blue elderberry* | - plant 2 |
| *Willow* | - plant 10 poles near creek water level or with irrigation, away from dense ivy |
| *Cottonwood* | - replace with 4 blue elderberry trees and 5 willow poles (as described above) |
| <u>Shrubs</u> | |
| *Holly-leaved cherry* | - plant 1 |
| *California blackberry* | - replace with 6 mugwort |

- Remove browse control cages only where they are confining growth of plantings. Leave empty cages in place as visual aids for counting survival and relocating transects in Year 3.

### Site #2 (Auzerais Avenue)

- Install a reliable irrigation system (gel packs, spray or drip system) and irrigate during Year 3.
- Continue managing non-native grasses and other weeds.

*(continues on following page)*

- Install 10 replacement plantings in existing basins to bring survival rates above 80%:

  Trees
  *California buckeye* - plant 2
  *Coast live oak* - plant 5

  Shrubs
  *Holly-leaved cherry* - plant 3

- Remove browse control cages only where they are confining growth of plantings (these are marked with white flagging). Leave cages in place around dead plants for use in replacement planting and/or as visual aids for counting survival and relocating transects in Year 3.

## 9.0 REFERENCES

Biotic Resources Group. December 2, 2008. *Los Gatos Creek Trail Reach 4 Riparian Mitigation Year 1 (2008) Monitoring Report*. Prepared for City of San Jose, City Facilities Architectural Services and David Powers & Associates.

Biotic Resources Group. December 12, 2005. *Los Gatos Creek Trail Reach 4 Riparian Mitigation Maintenance Manual*. Prepared for City of San Jose.

Bonham, C.D. 1989. *Measurements for Terrestrial Vegetation*. John Wiley & Sons. New York.

H.T. Harvey & Associates. September 14, 2004. *Final Los Gatos Creek Trail Reach 4 Trail Extension Riparian/SRA Habitat Mitigation and Monitoring Plan*. David J. Powers & Associates.

# APPENDIX A

# FIGURES 1 - 4

LSA

FIGURE 1

*Los Gatos Creek Trail Reach 4 Riparian Mitigation Project*
*Year 2 (2009) Monitoring Report*

Regional Location of Project

N

0 10
MILES

SOURCE: ©2006 DeLORME. STREET ATLAS USA®2006.

P:\SJO0901\g\RiparianMitigation\Figure1_RegionalLocation.cdr (12/03/2009)

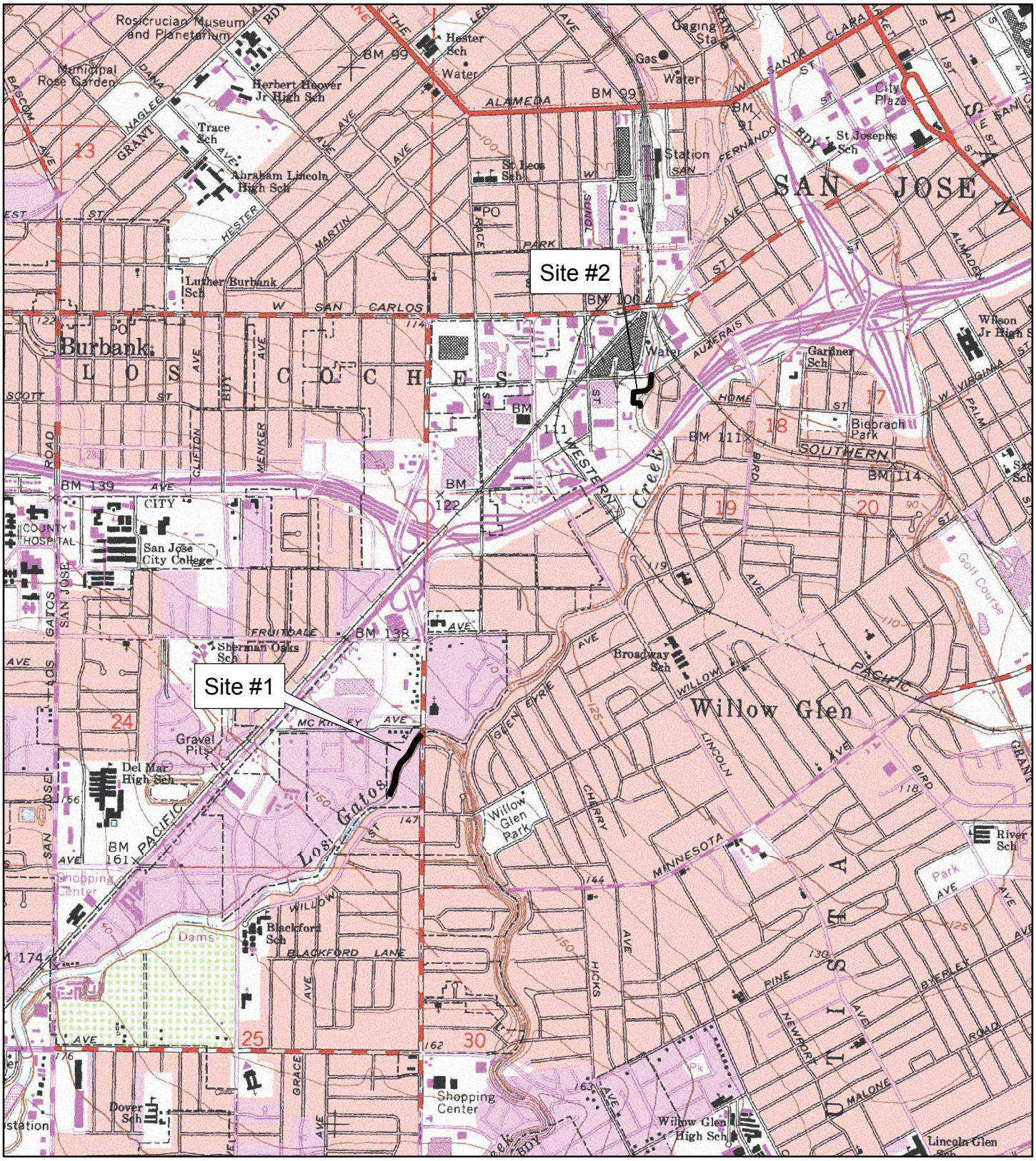


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FIGURE 2

*Los Gatos Creek Trail Reach 4*
*Riparian Mitigation Project*
*Year 2 (2009) Monitoring Report*

N

0 1,000 2,000
Feet

Mitigation Site #1
and Site #2

Source: USGS 7.5' topographical quad: San Jose West
I:\SJO0901\GIS\Maps\Figure2_ProjectLocation.mxd (11/30/2009)

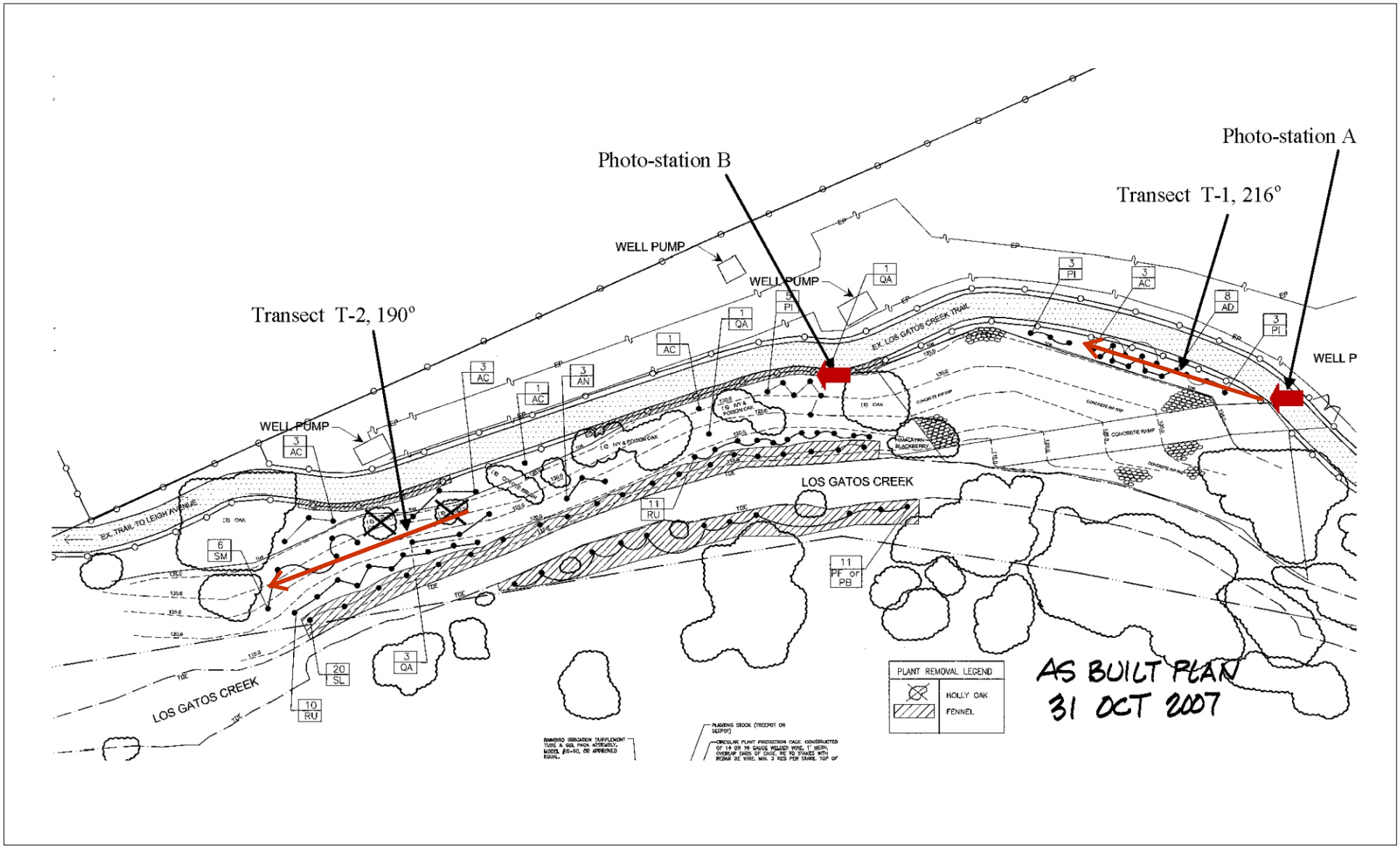


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FIGURE 3

*Los Gatos Creek Trail Reach 4 Riparian Mitigation Project*
*Year 2 (2009) Monitoring Report*

Site #1 - Meridian Avenue

NOT TO SCALE

MAP SOURCE: CITY OF SAN JOSE

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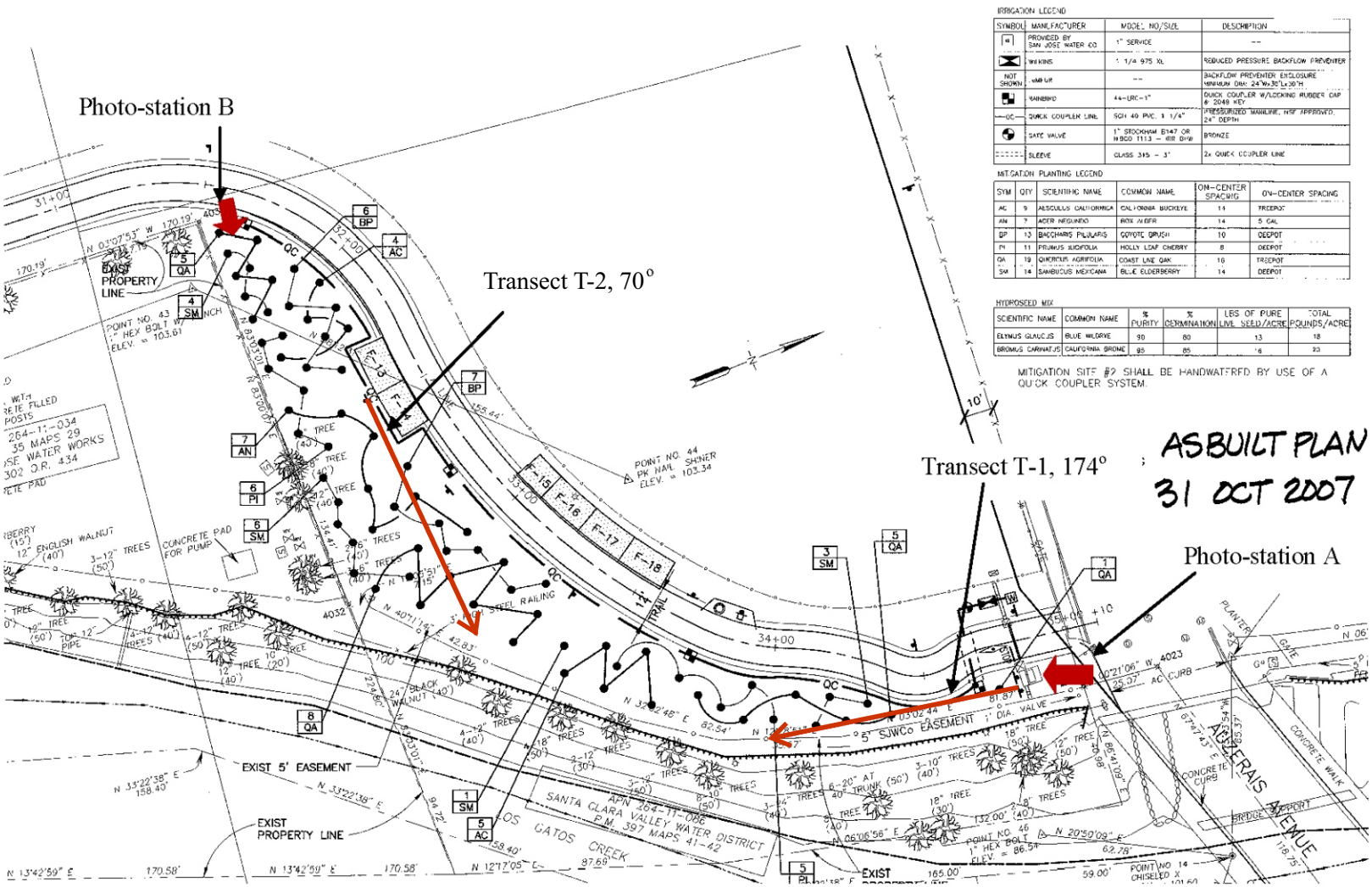


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FIGURE 4

*Los Gatos Creek Trail Reach 4 Riparian Mitigation Project*
*Year 2 (2009) Monitoring Report*

Site #2 – Auzerais Avenue

NOT TO SCALE

MAP SOURCE: CITY OF SAN JOSE

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# APPENDIX B

# SITE PHOTOGRAPHS

Photo 1: Site #1, Photo Station A, Transect T-1 facing 216°, Year 2 (October 2009)

Photo 2: Site #1, Photo Station A, Transect T-1, Year 1 (October 2008)

Photo 3: Site #1, Photo Station B, Year 2 (October 2009)

Photo 4: Site #1, Photo Station B, Year 1 (October 2008)

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FIGURE 3

*Los Gatos Creek Trail, Reach 4 Riparian Mitigation Project*
*Year 2 (2009) Monitoring Report*

Site Photographs

Photo 5: Site #1, Transect T-2, facing 190°, Year 2 (October 2009)

Photo 6: Site #1, Transect T-2, facing 10°, Year 1 (October 2008)

Photo 7: Site #1, box elder plantings on upper creek bank, Year 2 (October 2009)

Photo 8: Site #1, willow plantings on lower creek bank, Year 2 (October 2009)

Photo 9: Site #2, Photo Station A, Transect T-1 facing 174°, Year 2 (April 2009)

Photo 10: Site #2, Photo Station A, Transect T-1 facing 174°, Year 1 (October 2008)

Photo 11: Site #2, Photo Station B, Year 2 (April 2009)

Photo 12: Site #2, Photo Station B, Year 1 (October 2008)

Photo 13: Site #2, Transect T-2 facing 70°, Year 2 (April 2009)

Photo 14: Site #2, Transect T-2 facing 70°, Year 1 (October 2008)

Photo 15: Site #2, oak mortality due to insufficient irrigation in Year 2 (October 2009)

Photo 16: Site #1, holly-leaved cherry planting burned by small brush fire in Year 2 (photo taken July 14, 2009)